contacting a variant recombinase identified by the method of claim 1 with [first and second] third and fourth DNA sequences,

wherein the [first] third DNA sequence comprises a [first] fifth recombination site and the [second] fourth DNA sequence comprises a [second] sixth recombination site,

wherein the variant recombinase mediates recombination between the [first and second] fifth and sixth recombination sites thereby producing the site specific recombination.

25. (Amended) The method of claim 24 wherein the [first] fifth recombination site, the [second] sixth recombination site, or both, are variant recombination sites.

26. (Amended) The method of claim 24, wherein the [first and second] third and fourth DNA sequences are connected by a pre-selected DNA segment.

27. (Amended) The method of claim 26, wherein the [first and second] fifth and sixth recombination sites have the same orientation and the site-specific recombination of DNA is a deletion of the pre-selected DNA segment.

29. (Amended) The method of claim 27 further comprising contacting the variant recombinase with a [fourth] fifth DNA sequence comprising a [third] seventh recombination site, wherein the [second and fourth] fourth and fifth DNA sequences are connected by a second pre-selected DNA segment.

30. (Amended) The method of claim 29 wherein the [first] fifth recombination site is a variant recombination site recognized by the variant recombinase and not by wild type recombinase, and wherein the [second and third] sixth and seventh recombination sites are recombination sites recognized by wild type recombinase and by the variant recombinase.

31. (Amended) The method of claim 30 further comprising, prior to contacting the variant recombinase with the [first, second, and third] fifth, sixth, and seventh recombination sites, contacting the recombination sites with wild type recombinase, thereby producing site specific recombination between the [second and third] sixth and seventh recombination sites resulting in a deletion of the second pre-selected DNA segment.

33. (Amended) The method of claim 26, wherein the [first and second] fifth and sixth recombination sites have opposite orientations and the site-specific recombination is an inversion of the nucleotide sequence of the pre-selected DNA segment.

34. (Amended) The method of claim 33, wherein the [first and second] fifth and sixth recombination sites are variant recombination sites recognized by the variant recombinase.

36. (Amended) The method of claim 24, wherein the [second and third] fourth and fifth DNA sequences are introduced into two different DNA molecules and the site-specific recombination is a reciprocal exchange of DNA segments proximate to the recombination sites.

37. (Amended) The method of claim 36, wherein the [first and second] fifth and sixth recombination sites are variant recombination sites recognized by the variant recombinase.

38. (Amended) The method of claim 24 wherein the [second] fourth DNA sequence includes a label, wherein recombination between the [first and second] fifth and sixth recombination sites associates the label with the [first] third DNA sequence.

39. (Amended) The method of claim 38 wherein the [first] third DNA sequence is a large circular DNA molecule.

41. (Amended) The method of claim 40 wherein the variant recombinase is contacted with the [first and second] third and fourth DNA sequences by introducing into the cell [a third] a sixth DNA sequence comprising DNA encoding the variant recombinase.

42. (Amended) The method of claim 41, wherein the [third] sixth DNA sequence further comprises a regulatory nucleotide sequence and expression of the variant recombinase is produced by activating the regulatory nucleotide sequence.

45. (Amended) The method of claim 40, wherein the [first and second] third and fourth DNA sequences are connected by a pre-selected DNA segment, wherein the first and second recombination sites have the same orientation and the site-specific recombination of DNA is a deletion of the pre-selected DNA segment.

Remarks

Claims 1-49 are pending. Claims 3, 24, 25-27, 29-31, 33, 34, 36-39, 41, 42, and 45 have been amended. Claim 3 has been amended to clarify that it is the recombination frequency that is significantly reduced. Support for the amendments made to claim 3 can be found, for example, at lines 28-13, bridging pages 93 and 94. Claim 24 and the claims dependent thereon have been amended to provide clarity to the claimed composition. Claim 24 has been amended to refer to a set of recombination sites using different denotations (i.e. fifth site, sixth site). These sites are recognized and recombined by the variant recombinase *identified* in claim 1. The sites may or may not comprise identical sequences used to identify the variant recombinase in claim 1 (i.e. the first, second, third and fourth sites). All claims dependent from the newly amended claim 24